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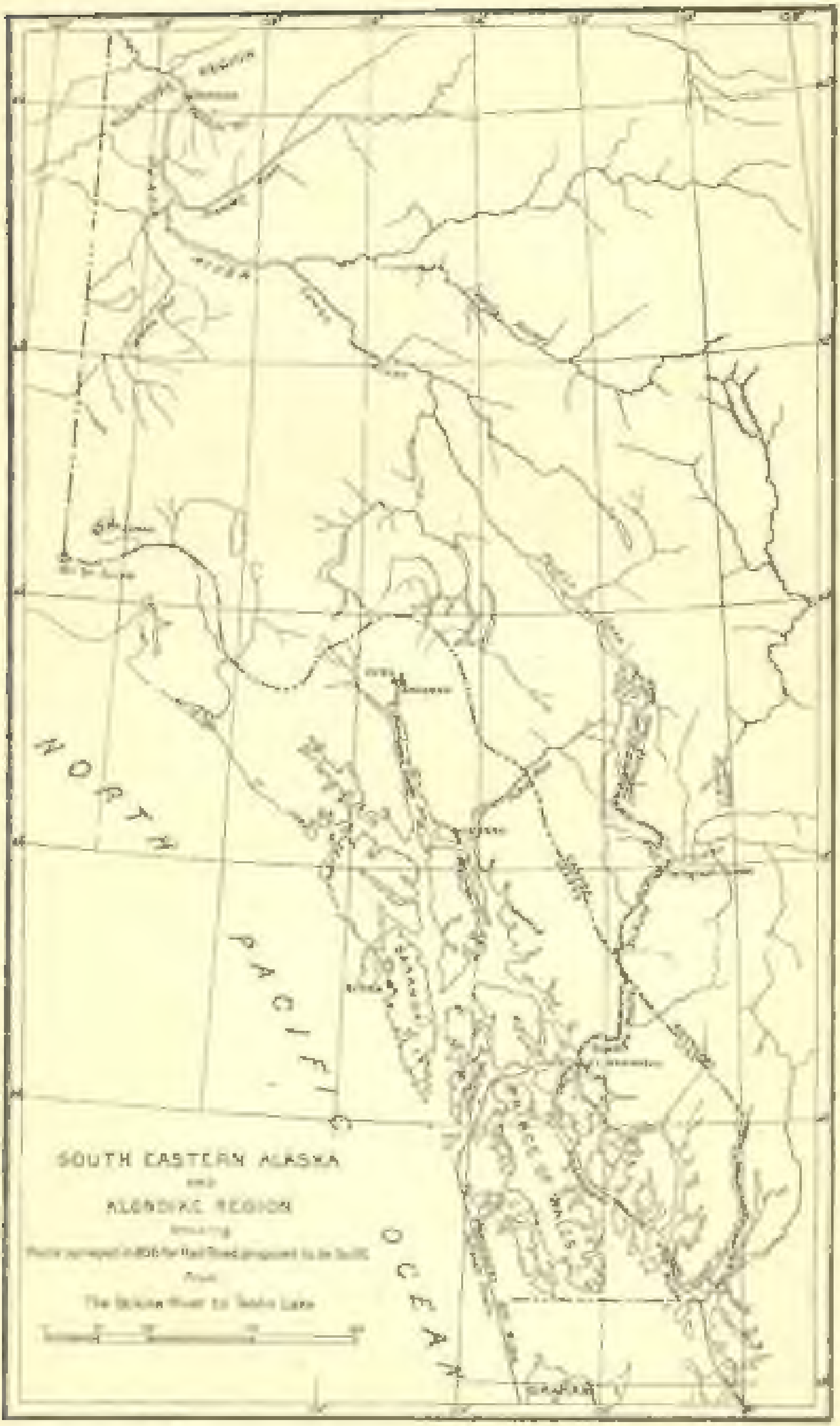
SOUTH EASTERN ALASKA
AND
ADJACENT REGION
Showing
Route surveyed in 1898 for Rail Road proposed to be built
From
The Stikine River to Teslin Lake
SCALE

THE

National Geographic Magazine

VOL. X OCTOBER, 1899 NO. 10

LIFE ON A YUKON TRAIL.

By ARTHUR PRANCE HENRY, Ph. D.

The Stikine river is the chief feature of the hydrography of northern British Columbia. The waters of this stream mingle with the Pacific near Fort Wrangell, Alaska. Along 2,000 miles further around the big Alaskan peninsula the waters of the majestic Yukon pour into Behring sea. These rivers, 2,000 miles apart at their mouths, are less than 200 miles apart at the nearest point of their headwaters.

As the Stikine is open to free navigation by treaty with the United States, it was proposed by the Canadian authorities when the Klondike excitement was at its height to build a narrow-gauge railway from Glenora, the head of navigation on the Stikine, to Teslin lake, one of the principal sources and feeders of the Yukon. It was claimed that with the completion of the railway a passenger could go through from Vancouver to Dawson in fifteen days, with no greater inconvenience than the labor involved in stepping from the river steamer to the train. It was hopefully predicted that with the opening of the route the bulk of Klondike trade would be diverted from the American ports of Dyea, Skagway, and St Michael, and the volume of outfitting trade transferred from Seattle to Vancouver and Victoria. After four months of preliminary survey work for the proposed railway the project was in June, 1898, abandoned. A number of causes contributed to the collapse of the enterprise: First, the waning of the Klondike excitement; second, the failure of the Dominion senate to ratify a heavy subsidy granted the road by the Canadian assembly; and, third, the energy in execution dis-

played by American capitalists in pushing the enterprise of a road to Lake Bennett via the White pass. Scarcely too much could be said for the All-Canadian route as a potentiality, but as an actuality, in the undeveloped graces of early infancy, it justly earned the reputation of being the most arduous and difficult of all the so-called practicable trails to the Yukon goldfields.

Compelled by ill-health to suspend for two years all work requiring mental stress, the writer became tolerably familiar in the mountains of southern British Columbia with the natural requirements of various rough seasonal employments and the natural characteristics of various rough folk of the mines and logging camps. It was a desire to add to these experiences with rough jobs and rough people that led him to apply for a subordinate position on the exploration and survey party dispatched in the winter of 1898 to the northern wilderness in the interests of the All-Canadian route to the Yukon.

Our party of 13 men took steerage passage in February from Vancouver, B. C., to Fort Wrangell, Alaska, in a battered old Chinese freighter, the *Amur*. From this point we crossed an open water to Cottonwood island, at the mouth of the Stikine river. It was the purpose of the party to move up the river for 150 miles over the ice to Telegraph creek. From this point we were to strike northward into the interior, for the purpose of running preliminary surveys 110 miles to Teslin lake, one of the principal sources and the head of navigation of the Yukon.

Camped on the ice and dirty snow at the mouth of the Stikine was a motley crowd of not less than 1,000 men who had been diverted from the southward routes to the Klondike by false reports about the opening of this new route. They had been informed that a serviceable trail connected Telegraph creek with Teslin lake. Many, too, had visions of town sites along the proposed railway, and hoped to "get in on the ground floor." They were sadly misled. The information was false, and the major portion of the wayfarers, after months of struggle, were utterly baffled in the attempt to thread their way through a remorseless wilderness of mountain and swamp to Teslin lake.

We were better equipped for making an expeditious journey up the river and soon the bulk of these fortune-seekers were left far in our rear. Our outfit consisted of a four-months' supply of bacon, beans, flour, baking powder, provender for the horses, and the usual camp impedimenta of tents and blankets. The entire outfit weighed about four tons. We camped on four feet

of soft snow and waited for the rain to come in order to get out of the mild coast belt and proceed over the snow up the river. The few days of waiting on the inland were enlivened by sights and incidents of some contemporaneous human interest. The place seemed to be a reservation for the exhibition of many unusual features of human crankery. All sorts of business ventures, more or less quixotic, were in evidence, from the saloon-keeper who intended to haul a barrel of whisky up the river on a hand-

STEAM LOCOMOTIVE ON RUNNERS—DESIGNED TO DRAW HEAVILY LOADED VANS OVER THE SNOW

sled to the man who was taking along a 60-foot steamboat in sections for launching on Teslin lake. One of the most extraordinary manifestations of genius for impracticabilities was Captain Armstrong's snow train. This was nothing less than a steam locomotive on runners, designed to draw heavily loaded vans of freight for 300 miles over the surface of the snow by means of a windlass and steel-wire cable carried ahead to anchorage. The snow train was hauled after incredible exertion eight miles up the river and there abandoned.

During the early stages of the river journey we ordinarily made the morning start between midnight and two o'clock a. m., in order to get the advantage of an unbroken crust. It was dreary work plodding on by the creaking sledges several hours before daylight, the heavy snow of the broad river stretching out mysteriously in the gloom before us like some gray morass. It was pleasant to think at these times that the whirling earth was bringing the genial sun flying across the continent; pleasant to think of Washington fully awake, of Chicago stirring massily in the equinox of a new day. As our turn comes the forms of the giant peaks to the east gain detail and color in the gray pallor of the dawn. Soon the crests stand forth rosy against a pale pink sky-line, and tidings of coming day are flashed to the dark green spruce forests that lie in shadow on the river's brink. With the sun fully above the mountain crests the glare in the valley becomes painful. The snowy expanse of the river and its mountain walls glitters and scintillates with cruel brilliancy. Every one becomes more or less afflicted with snow-blindness.

and complexions deepen into the hue and finish of red earthenware crockery. The writer's sleeping companion, John, the cook, introduced the device of daily blackening his face with soot from a charred fagot. It helped, he said, to soften the intolerable glare. Traces of these applications were visible upon a more or less wrinkled and pachydermatous face many weeks later.

About the middle of March we crossed the Alaskan boundary, 40 miles up the river, and two miles beyond passed the dead body of a man wrapped in canvas and strapped to a tree near the river's brink. Hard-by stood a hand sled and its empty harness. The gaunt stark figure and the motionless sled in the silent white desert told the brief story of the hope that had braved the wilderness and of the quest that had failed. We bivouacked nightly under the stars on the ice of the river. There was no unpacking of tents or removal of clothing. The tired men stretched themselves in couples upon a layer of blankets, over which were drawn more blankets and a tarpaulin, and were soon sunk in stertorous slumber. There were those in the party who could not sleep more than half the night while "lying out" on account of the cold. To crawl forth in the dead of the night from a heap of blankets in a semi-torpid condition for the purpose of thawing out by a painfully kindled fire was distinctly sombre work.

About 50 miles up the river the base of a great glacier was skirted, whose jagged billows of bluish ice silhouetted against a cloudless sky-line had been a sort of pillar of cloud by day for many weary miles of travel. The humpiness of the boulders on the beaches and the plainly defined serratchings on the grim faces of the deeply serrated ridges testify to the shrinking of a great ice-sheet in the remote ages of the past. The present-day glaciers, the literal selvas of this ice-matrix, lie anchored in splendid isolation upon the flanks of the lofty mountains that hem in the river. The course of the river through 200 miles of cross ranges, that might not be inaptly termed the Cordilleras of North America, is contentious and turbulent, circumventing barriers by abrupt bends. About 60 miles upstream the pent-up current boils through a gloomy cañon not 100 feet in width, but ordinarily the stream flows compactly to the sea between banks that are anywhere from 300 to 2,000 feet apart.

The heaviest snow encountered on the river was in the Forty-mile stretch between Fifty-five mile camp and the cañon. The snow lay in great wind-driven drifts from bank to bank, often

concealing their ice. The ice varied from a few inches to four feet in thickness. At short intervals steel-pointed picket rods were thrust through the snow in advance of our heavy sledges, and the distance was covered in safety. Many outfits were lost through the ice in this stretch and six cases of death by drowning came to our notice.

Our outfit was well in advance of the bulk of the movement up the Stikine. Some light dog-teams had passed up the river a few days before, and the snow compacted by these sleds would ordinarily sustain the weight of our horses. The trail was a succession of heavy ruts and furrows; it was impossible for the horses to step to the snow on either side of the beaten track. The crust yielded even to the light cayuses or Indian ponies, and they floundered helplessly until lifted bodily back again to the trail. We struggled toilsomely through morasses of soft snow, tugging and heaving on the heavy sledges, while the teamsters urged on the discouraged horses. One Sunday, after making detours of ourselves for half the day to our efforts to get the horses through heavy drifts, we hit upon the plan of drawing the beasts to a place of security on the sledges. The horses were accordingly detached, the loaded sledge drawn ahead, and the baggage removed. We then returned, and binding a worn-out horse securely to the top of the sledge, every man in the party laid hold of the tow-rope and tugged the beast up the river to where the stores had been deposited. Most of the men who had come thus far with horses had gone into camps on the river's bank in order to save the lives of their beasts. Little pools of blood along the trail marked the points where tired animals, cut by the crust, had been halted for a rest. The gaunt and wasted carcasses of dead horses and dogs by the wayside told the story of overwork and of exhausted food supplies.

On Tuesday, March 25, after three weeks of travel on the river, we rounded a bend of the stream and beheld Glenora. From Fort Wrangell to this point no settled human habitation had met the eye. Now we perceived that Cullerenth's log-trading cabin and a dozen Indian shacks perched squat-like on a low margin of river bank formed the settlement that made us brave a showing upon the maps of that region. Two months later the Indian shacks had been turned into hotels and 15 saloons were doing a lively business. A local weekly newspaper was being hawked through the streets at 25 cents a copy. Outfits were

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[illegible] narrow [illegible] through the storm [illegible] were [illegible] and the [illegible] back to the south slope of the divide.

The snow lay seven feet deep over the stunted willows that grew about the head of a mountain stream we were following to the Taku [illegible]. The stream was located and a [illegible] was [illegible] through the snow [illegible] water. [illegible] of water were thrown upon the dry granulated snow in order to get a substantial flooring for a single tent. After four hours of work seven men managed to find shelter from the storm. [illegible] wood and began to build the [illegible] partly recovered [illegible]; but [illegible] one hour [illegible] the sheet iron stove [illegible] over [illegible] and settled two feet in the snow. This [illegible] the stove pipe at one of its [illegible] a dense cloud of smoke filled [illegible] happy home. It was a case of *sauve qui peut*. Every one fled to the open air [illegible] above the howling of the storm an over-sensitive ear might now have caught [illegible] that [illegible] an extraordinary exigency [illegible] from the vocabulary of the [illegible] profane.

TIDES OF CHESAPEAKE BAY

By E. D. Preston

U. S. Coast and Geodetic Survey

An extensive plan to fix a permanent tidal plane for the Chesapeake bay has recently been undertaken by the U. S. Coast and Geodetic Survey. During the last fiscal year nearly eighty stations were occupied, at 13 of which we are in possession of simultaneous tidal observations extending over one complete lunation.

The application of harmonic analysis to this unique series [illegible] will pave the way for correct predictions [illegible] and will also result in the establishment for the whole bay of a plane of reference of unequaled permanence and undoubted accuracy. [illegible] one of the first [illegible] of [illegible]. The accuracy with which [illegible] depends [illegible] the nature of the work based upon it. In [illegible] surveys [illegible] have

[illegible]

THE RELATION OF FORESTS AND FOREST FIRES

By Gifford Pinchot

Forester of the U. S. Department of Agriculture

The study of forest fires as an element of the composition and reproduction of the forest is as yet in its earliest stages. Remarkably little attention in view of the importance of the subject has hitherto been accorded to it. A few observers who have worked in contact with the forest itself have [illegible]. Most of the botanists have grouped fire with temperature and moisture as one of the great factors which govern the distribution and character of forest growth, but so little has been said or written upon the subject that the opinion of each man seems to have been reached independently and upon the single basis of personal observation. The documents upon the subject still reside, with very few exceptions, in the forest itself. It is of course true that an acquaintance with what might almost be called the current relation of forest fires would be no longer, for only through a knowledge of this relation and through the insight which such knowledge brings can there be gained a clear understanding of how and why fires do harm, and how best they may be prevented or extinguished.

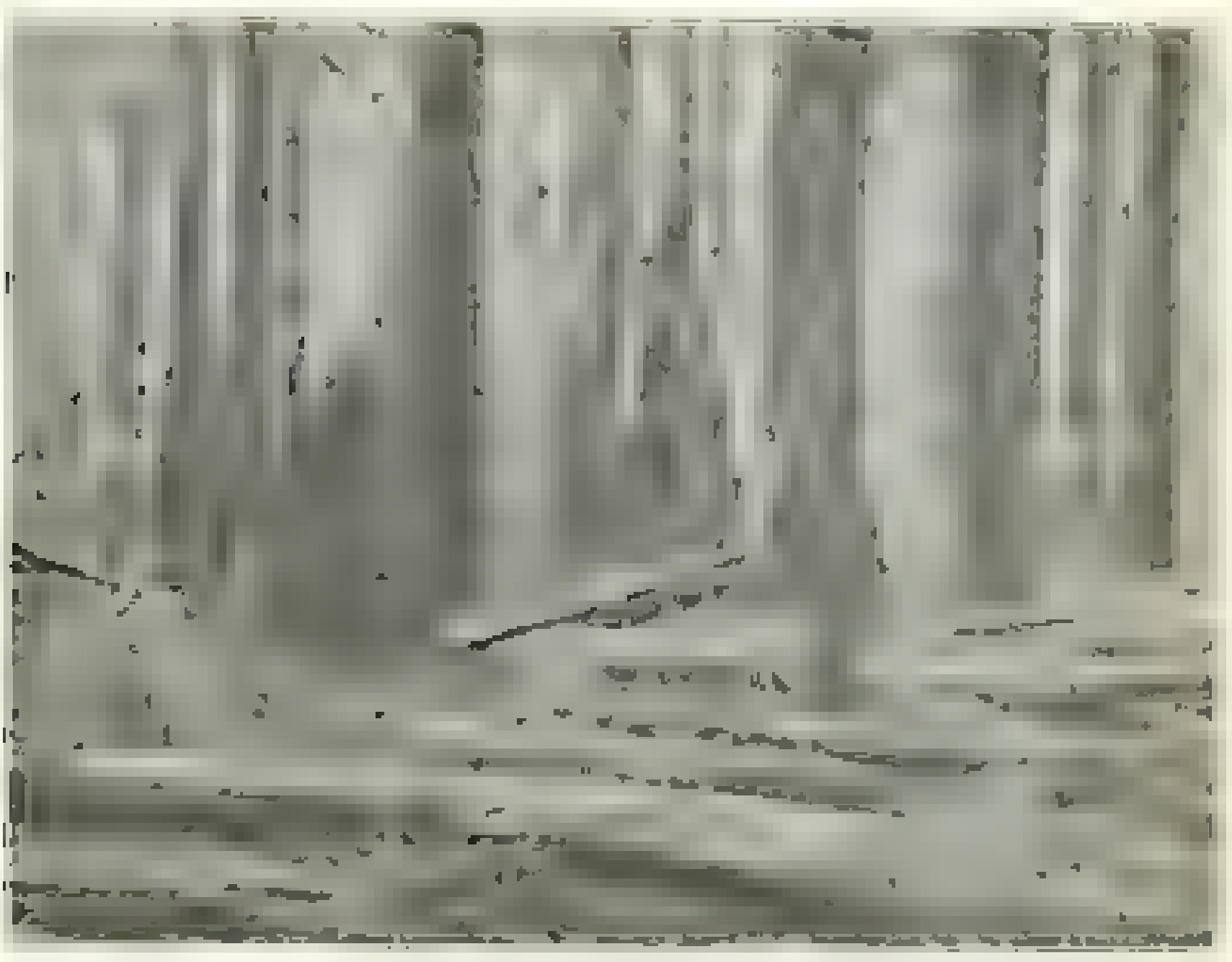
The records of past fires, written in the forest now on the ground, are often decipherable for more than a hundred years back, and in many cases for more than twice that length of time. Such records throw light on the result of [illegible] fires as [illegible] events, and are consequently the most valuable of all documents upon the somewhat intricate but most important question of the final effect of fire upon the forest; for we must clearly realize, before the present situation can be understood in its proper sequence, that we have not stated everything when we say that a given forest is destroyed by fire. The forests which the first white explorers saw as they came upon this continent had undoubtedly overrun [illegible] were themselves the successors of others, which through thousands of years were burned down at intervals that we can no longer trace. There is but a small part of the forest area of this country which does not bear, either in [illegible] or in the character of its growth

altogether protected. The set of facts which they ultimately [illegible] and establish [illegible] condition is found in the [illegible] [illegible] exclusively [illegible] by trees in semi-arid regions, which protect stretches under along water-courses, and some islands [illegible] by nature, or on rough and stony ground, and so protected by the absence of enough grass or other herbage [illegible] in order to carry a destructive flame.

[illegible] of reasoning [illegible] what a kind of [illegible] glades or prairies well named "fire-glades" by Mr Frederick V. Coville, Botanist of the U. S. Department of Agriculture. In the Black Hills of South Dakota, for example, these places, surrounded by forest-bearing land, are almost exclusively confined to ground rich enough to support a crop of grass sufficiently dense to burn fiercely, while the timber is restricted to rough rocky areas and is almost always [illegible] the [illegible] comparatively safe from fire because of the scantiness of the minor vegetation it is able to support.

In semi-arid regions where fire-glades of this kind occur there is an interesting alternation, by years or series of years, of the prevalence and absence of fire [illegible] which makes forest reproduction possible. In the same way the occurrence or absence of burning gives or refuses an opportunity for young seedlings to reach a size at which they are reasonably safe from the attacks of ordinary surface fires. It must be clearly borne in mind that it is only the average effect of the class of causes of which fire is one [illegible] with which we are concerned. Yet [illegible] may succeed for [illegible] of [illegible] the midst of fire-glades [illegible] and the rocky [illegible] where [illegible] seedlings [illegible] the fire [illegible] over, as the [illegible] frequently [illegible]. But these [illegible] work [illegible] of the averages [illegible] they [illegible] powers [illegible] to lengthen the time [illegible] the average [illegible] work [illegible]. Thus [illegible] the fire-glades of the Black Hills [illegible] extremely slow.

Perhaps the most remarkable of the [illegible] effects of fires [illegible] to the composition of the forest [illegible] kinds of trees of which it is composed and the proportion of each. These [illegible] fire [illegible] with the various [illegible] which trees possess. These qualities are of two chief kinds, one [illegible] of the [illegible] tree [illegible] its own powers [illegible] the



valuable commercial tree, is governed, first of all, so far as we know at present, by fire. Had fire been kept out of these forests during the last thousand years the fir which gives them their distinctive character would not be in existence, but would be replaced in all probability by the hemlock, which fills even the densest of the fir forests with its innumerable seedlings. I hasten to add that these facts do not imply any necessity for the fires which are now devastating the West.

These examples of the relations of fire and the forest are cited because they are of interest as among the few which have already been worked out. Without question a number of relations of vastly greater importance remain to attract and reward the student of this branch, one of the most fruitful of new fields in one of the most fascinating and fruitful branches of forestry in the United States.

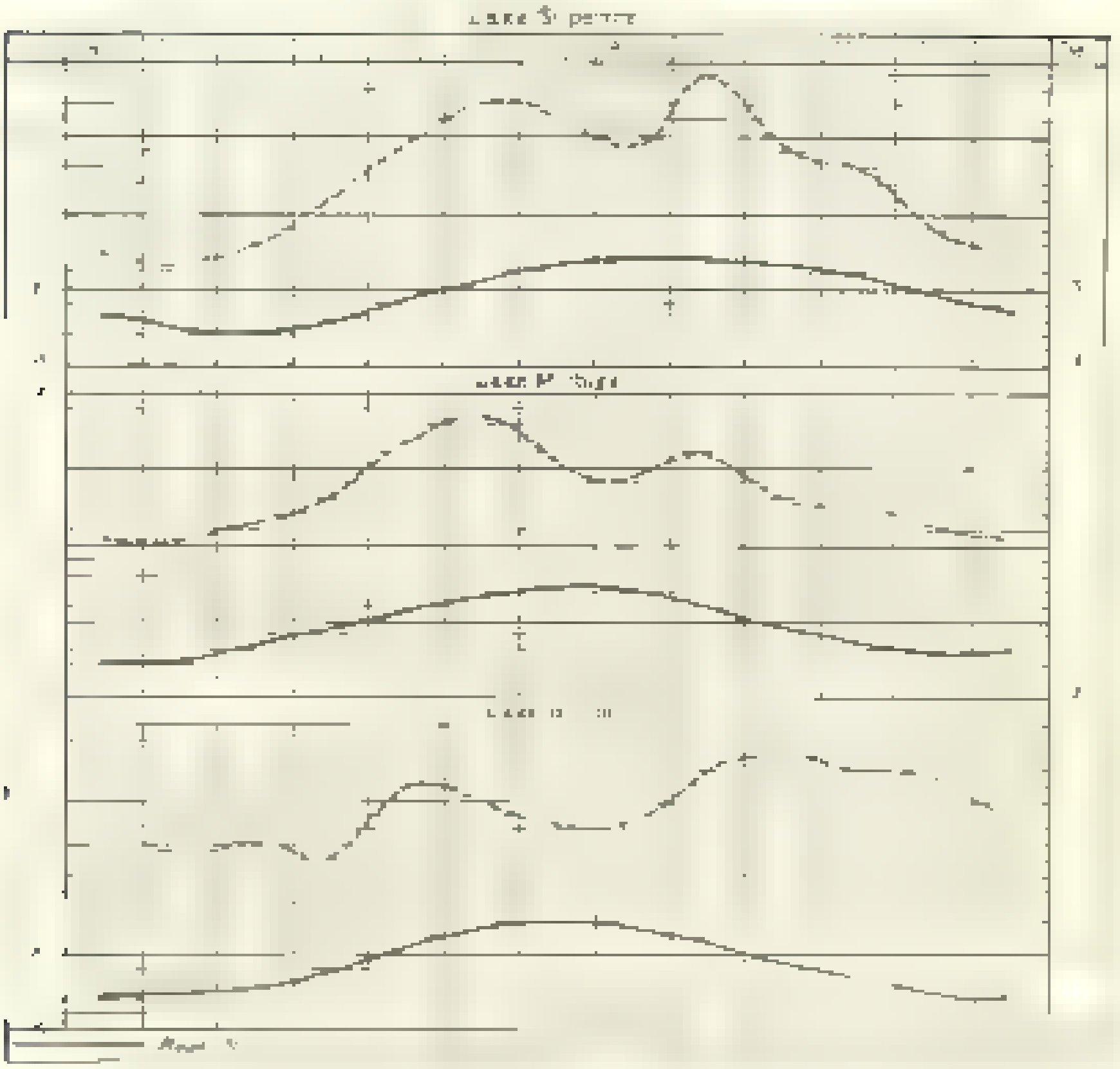
VARIATIONS IN LAKE LEVELS AND ATMOSPHERIC PRECIPITATION

BY ALFRED J. HENRY,

Chief of Division of Records, U. S. Weather Bureau

A study of the fluctuations in the surface level of the Great Lakes is always an interesting problem. It is especially so at the present time owing to the near completion of the Chicago drainage canal and the projection of various industrial enterprises which, when completed, will withdraw large quantities of water from the present channels. The physical problems involved in the regulation of the level of the lakes by artificial dams, as are also the economic interests involved, are recognized. The writer desires at this time, however, merely to point out the necessity of determining the probable level of the lakes by accurately gauging the precipitation over the various watersheds.

The stage of water in a river or natural reservoir basin, such as the Great Lakes, is dependent primarily upon supply, discharge, and evaporation. In small streams the correspondence between precipitation and water stages is easily observed. The drainage basins themselves are small and when precipitation occurs but a short time elapses before all portions of the basin are contributing to the stream flow. In a small basin of uniform surface and slope it is possible to calculate the exact



thereafter, fell continuously from 1886 to [illegible]. The total fall being about two and a half feet.

The annual or yearly variation, both in lake level and in monthly precipitation over the respective watersheds, is shown in the diagram on page 44. The full curve shows the average level in feet of the surface of lakes Superior, Michigan and Huron below the plane of reference of the U. S. Lake Survey during a series of years. The dotted curve shows the average distribution of precipitation, in inches, throughout the year. The agreement between the two curves is as close as could be expected, considering the nature of the data on which they are based and the intervening differences between the regions under discussion.

The character of the Lake Superior watershed differs in several respects from that of the region to the southward, partly by reason of its greater elevation and partly on account of the lake itself. The precipitation of winter is generally in the form of snow, and is derived for the most part from storms advancing from the North Pacific or the Canadian Northwest. The snowfall is greatest on the south shore of the lake and is particularly heavy from the Keweenaw peninsula eastward to and beyond Wetmore on the Duluth, South Shore and Atlantic railway.

If the two curves showing the monthly rise in the level of Lake Superior and the distribution of precipitation in its watershed respectively are compared, it will be seen that the annual rise of the lake begins coincidentally with an increase of precipitation. We should not, however, too closely tie up these phenomena in the relation of cause and effect. The rise in the waters of the lake in the spring is doubtless due to the breaking up of the ice in the rivers and the melting of the snow. Water from these sources is fed into the lake during April and May more rapidly than it is discharged through the St. Marys river; hence the surface level rises. The rains of June, July and August, on the average equal about three inches per month, to which amount is added the run-off from the watershed to set against the loss by evaporation. The latter is, to a certain extent, an unknown quantity, varying somewhat from year to year. Under the most favorable conditions the loss by evaporation would not greatly exceed three inches. The height to which the waters of the lake will probably rise, therefore, must depend greatly upon the amount of water carried by the tributaries of the lake after the breaking up of the ice, plus the amount conserved during the spring and early summer in the swamps and forested areas

CALCULATIONS OF POPULATION IN JUNE, 1881.*

By Henry Farquhar,

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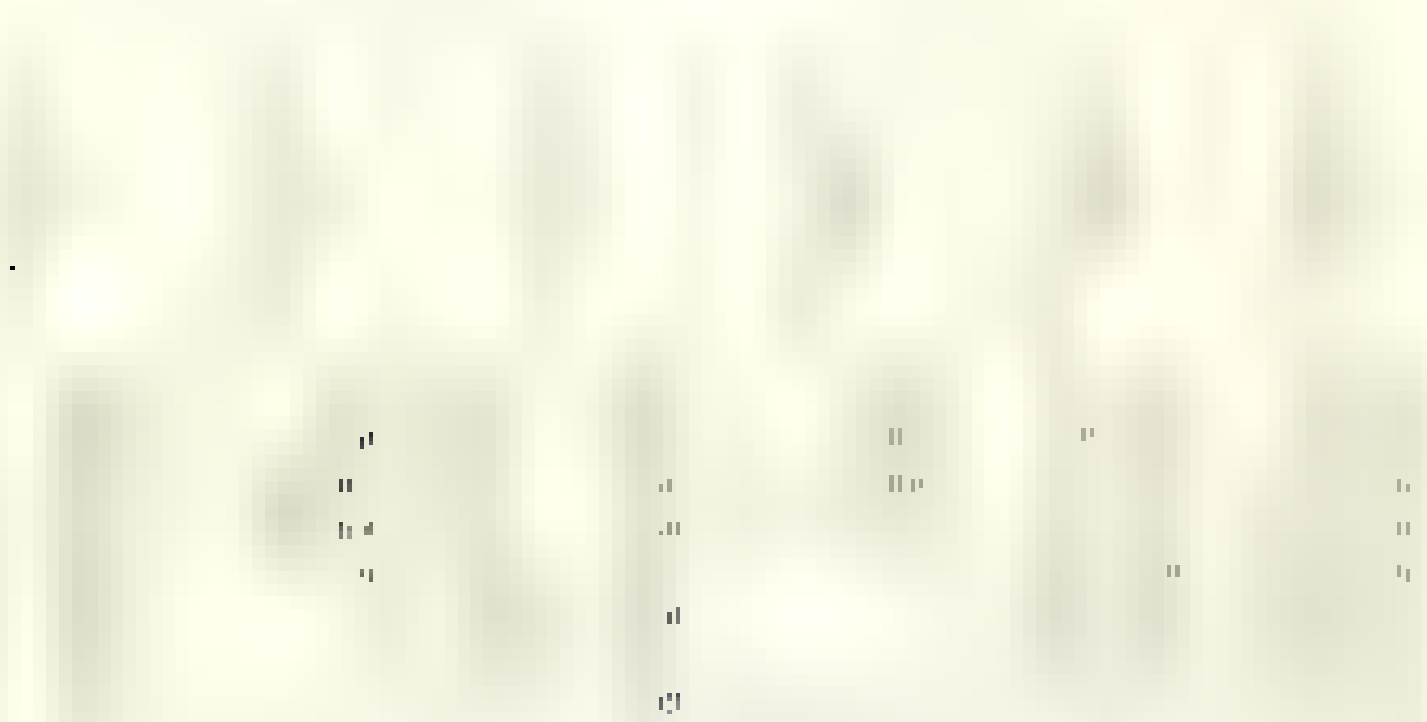


[illegible]

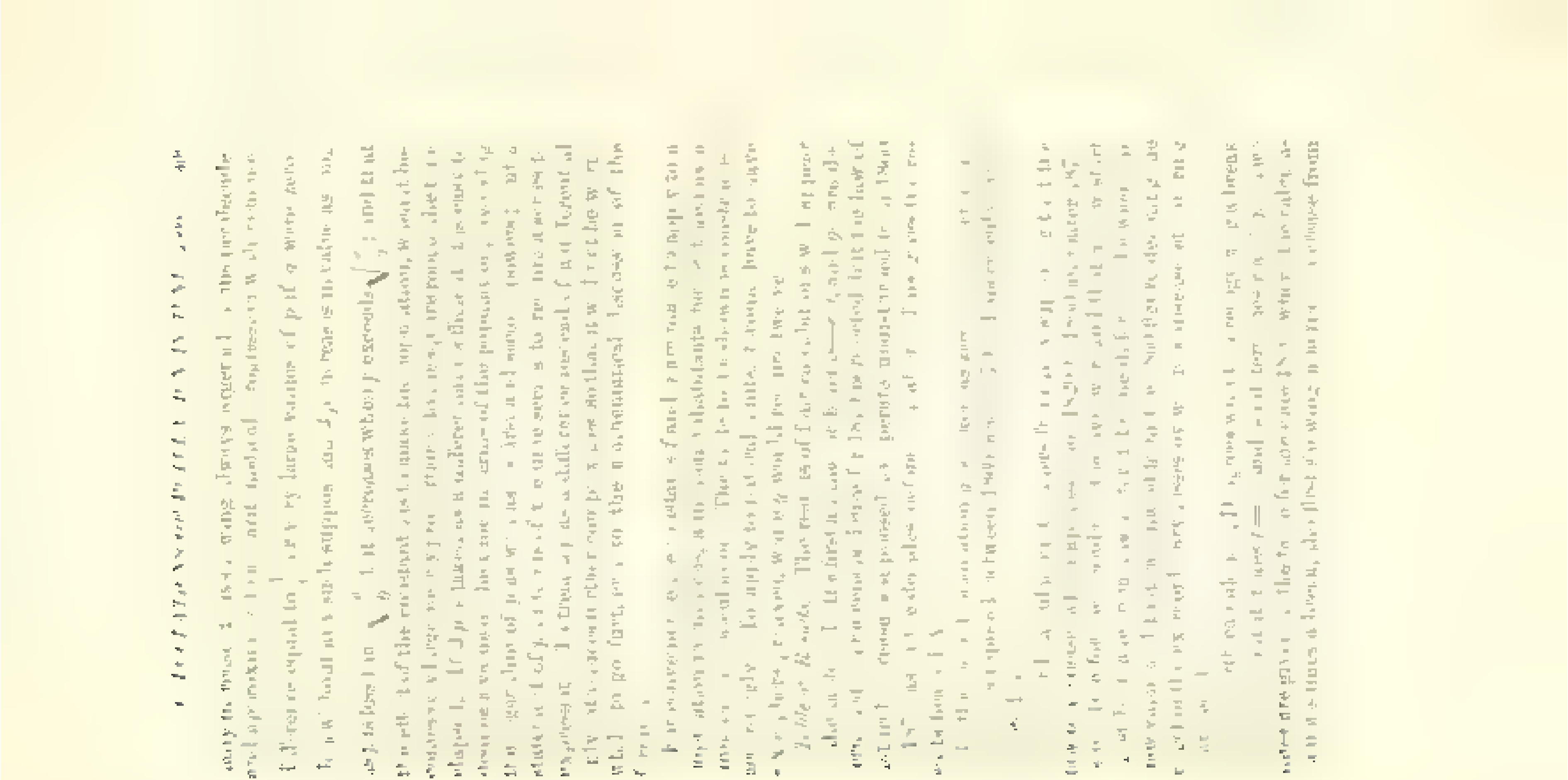
from the time of arriving to the end of the decade. If allowance were made for such increase, it would result in giving a smaller estimated population for the first day of June next. The correction is here neglected for four reasons: (1) Its uncertainty, for the assumption that each immigrant population immediately after arrival will increase at the same rate as that resident is only approximately true and there is no trustworthy way of tracing this element of the population from census to census; (2) the smallness of the amount involved, [illegible] reasonable estimate of the increase [illegible] question for any [illegible] with 1880, would not reach half a million, [illegible] on account of which the final result for 1890 could be affected a fraction being [illegible] when compared with errors necessarily [illegible] the uncertainty of [illegible] as well as deficiencies [illegible] the probability that the discordance between the 1870 and 1880 census figures, brought out by the application [illegible] here to be shown, is due more to deficiency of the latter rather than to excess of the former, so that any treatment which gives the figures as they stand leads to a lower [illegible] result for 1890 [illegible] be avoided. The "natural increase," [illegible] as here understood, is the total increase during the decade by census records, [illegible] only by the accession from immigration in that time.

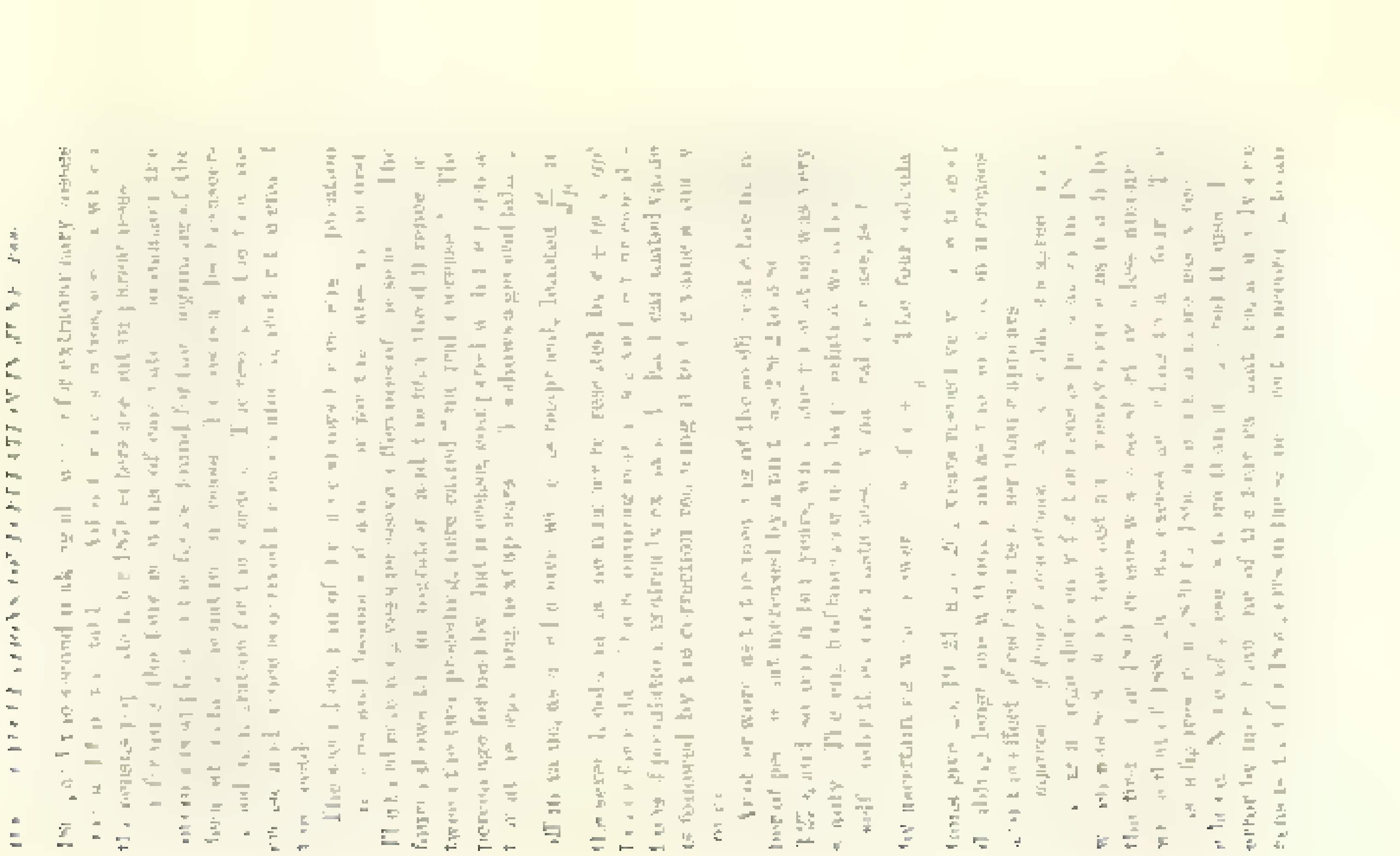
Law of Natural Increase.—In a new [illegible] compact territory the tendency of a population is to grow in a geometrical progression, the percentage of increase in that case constant for a constant interval, and the total population equal to some fixed quantity raised to a power represented by the time. After a period, longer or shorter, according to the capacity of the population to support itself on the soil, the percentage of increase falls off and grows lower as the population grows greater. The law of this falling off in the ratio is one which, in the present state of our knowledge, has to be determined empirically. The following formula is used, with some modifications to be explained in the calculations:

$$dp = e + \frac{f}{p} + gp^{n}$$

where p denotes the population, dp the natural increase in ten years, and e, f, g constant coefficients to be found by calculation.

It will be seen that this formula would give a geometrical progression if f and g were zero, that it gives a near approach to such a progression for small values of p, that dp would contin-





[illegible] taken as an [illegible] that [illegible] [illegible] totals, [illegible] others were [illegible] agreement [illegible] and those [illegible] [illegible] the contrary, [illegible] and D [illegible] agreement of A [illegible] every [illegible]

No attempt has been made [illegible] compare these results [illegible] error [illegible] work [illegible] results of the [illegible] A [illegible] the best [illegible] best results [illegible] and [illegible] of the writer [illegible] the result under C [illegible] nearer the truth than [illegible] under A. [illegible] does not [illegible] [illegible]

[illegible] as not, A [illegible] D require [illegible] for $\sqrt{\frac{c}{g}}$ = [illegible]

[illegible] A and [illegible] B. [illegible] the [illegible] [illegible] taking it [illegible] three-quarters of [illegible] A [illegible] the [illegible] the present [illegible] for [illegible] and [illegible] average and [illegible] [illegible] because it depends upon [illegible] the war, [illegible] The writer [illegible] three-quarters of [illegible] estimate for war losses in the 1870 [illegible] and that the [illegible] figures were, if any, [illegible] [illegible] that [illegible] the [illegible] [illegible] and [illegible] were [illegible] than [illegible] [illegible]

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THE DEFINITE LOCATION OF BOUVET ISLAND

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